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An Enumeration of Taiwan Boraginaceae

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ABSTRACT: This paper is a precursor of the complete revision of the Taiwan Boraginaceae. An enumeration of 12 genera and 24 taxa, including new combinations *Cordia aspera* G. Forster subsp. *kanehirai* (Hayata) H.-Y. Liu **comb. nov.** and *Heliotropium procumbens* Mill. var. *depressum* (Cham.) H.-Y. Liu, **comb. nov.**, is provided.

KEY WORDS: Boraginaceae, Flora, Taiwan.

INTRODUCTION

Since the main works on Boraginaceae for the Flora of Taiwan (Hou, 1950; Hsiao, 1978) were done, considerable progress has taken place in plant specimen collecting within the island (Peng and Yang, 1992) and in neighboring areas (e. g. Hara, 1979; Hatusima, 1994; Nowicke and Miller, 1991; Reidel, 1997; Yamazaki, 1993; Zhu *et al.*, 1995). While studying these new materials for the second edition of the Flora of Taiwan, the author has found it is necessary to make a more up-to-date family revision. However, since the detailed description of each taxon will be available in the second edition of the Flora at the end of this year, an enumeration with selected specimen citation is presented here to save space.

ENUMERATION

BOTHRIOSPERMUM Bunge 細果子草屬

1. **Bothriospermum zeylanicum** (J. Jacq.) Druce in Bot. Exch. Club Brit. Isles Rep. 4: 610. 1917. 細果子草

Anchusa zeylanica J. Jacq., Ecl. Pl. Rar. 1: 47, Pl. 29. 1812. (*non* Vahl 1807. *nom. nud.*)
Anchusa tenella Hornem., Hort. Bot. Hafn. 1: 176.1813.
Bothriospermum tenellum (Hornem.) Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 1: 23. 1835; Forbes & Hemsl. in J. Linn. Soc. Bot. 26: 152. 1890; Hou in Taiwania 1: 219. 1950; Hsiao in Fl. Taiwan 4: 393. 1978.

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Distributed in Japan, Korea, E. China, the Philippines, Vietnam, Indonesia, India, Pakistan, Afghanistan, and Central Asia. Taiwan, in fields at low altitudes.

Ilan: Nanshan, *Chuang & Kao 2433*. **Taipei**: Huoshaochang to Knakou, *Hsu 5249*; Yinhotung, *Hsu 4310*. **Hsinchu**: Hsiangshan, *Peng 3184*. **Nantou**: Chingshuikou, *Huang et al. s. n.* **Chiayi**: Chuchi, *Huang & Huang 14015*. **Tainan**: Sueichia, *Kao 10534*. **Kaohsiung**: Shangping, *Huang 15965*. **Penghu**: Shiwenlli, *Kuo 1140*. **Taitung**: Lanyu, *Huang & Hsu 4670*. **Hualien**: Juisui, *Liu 25*.

Vahl's plant of *Anchusa zeylanica,* not the species found in Taiwan, is a name without description, and has no priority over the Jacq's name.

CARMONA Cav. 滿福木屬

1. **Carmona retusa** (Vahl) Masam. in Trans. Nat. Hist. Soc. Taiwan 30:61. 1940. 滿福木

Cordia retusa Vahl, Symb. Bot. 2: 42. 1791.
Ehretia microphylla Lam., Tabl. Encycl. 1: 425. 1792; Kanehira, Form. Trees rev. ed. 637. 1936; Hou in Taiwania 1: 202. 1950; Hsiao in Fl. Taiwan 4: 400. 1978.
Carmona microphylla (Lam.) G. Don, Gen Hist. 4: 391. 1837.
Ehretia buxifolia Roxb., Corom. Pl. 1: 42. 1795; Forbes & Hemsl. in J. Linn. Soc. Bot. 26: 144. 1890.

Distributed in the Ryukyus, S. China, Malesia, Indo-China, Thailand, Burma, Sri Lanka, India, and Australia. Taiwan, in sunny thickets at low altitudes.

Chiayi: Peikan, *Liao & Kuo s. n.* **Pingtung**: Kankou to Wanchu, *Chuang 1096*.

Carmona, with its peculiar undivided and shortly beaked endocarp, has been regarded as a distinct genus from *Ehretia* by all recent flora workers, the author agrees.

COLDENIA L. 生果草屬

1. **Coldenia procumbens** L., Sp. Pl. 125. 1753; Hsiao in Fl. Taiwan 4:394. 1978.
臥莖同蘿生果草

Tropical and subtropical SE Asia, Africa, and Australia. Taiwan, in seasonally dry places, mostly found in rice-fields of southern Taiwan.

Kàohsiung: Takanshan, *Kao 10468*.

CORDIA L. 破布子屬

1. **Cordia aspera** G. Forster subsp. **kanehirai** (Hayata) H.-Y. Liu, **comb. nov.**
金平氏破布子

Cordia kanehirai Hayata, Icon. Pl. Form. 6: 31. 1916.
Cordia cumingiana auct. non Vidal: Hsiao in Fl. Taiwan 4: 395. 1978.

The Ryukyus. Taiwan, this subspecies is found in Lanyu and Peninsular Hengchun only, in thickets at low altitudes.

Pingtung: Kosyun, Matuda 1553. **Taitung**: Lanyu, Huang & Kao 5438.

The species *Cordia aspera* G. Forster (including *Cordia cumingiana* Vidal) is characterized by its calyx with 10 well-marked ribs (Reidel 1997), and is distributed in Australia, Pacific Islands, and Malesia. The populations of this species in the Ryukyus and Taiwan were misidentified as *Cordia cumingiana* Vidal (of the Philippines) in the past; however, these plants differ from other subspecies by their lanceolate leaves and sparsely strigose abaxial leaf surfaces.

2. **Cordia dichotoma** G. Forst., Fl. Ins. Austr. 18. 1786; Kanehira, Form. Trees rev. ed. 633. 1936; Hsiao in Fl. Taiwan 4: 395. 1978. 破布子

Cordia myxa auct non L.: Matsumura & Hayata in J. Coll. Sci. Univ. Tokyo 22: 253. (Enum. Pl. Form.) 1906.

The Ryukyus, S. China, Malesia, New Caledonia, Indo-China, Thailand, and Pakistan. Taiwan, in sunny thickets at low altitudes.

Taipei: Neihu, *Yang 2870*. **Miaoli**: Chiting, *Tang 478*. **Tainan**: Nanshi, *Huang & Huang 14209*. **Kaohsiung**: Sanping, *Huang 539*. **Pingtung**: Sehmen, *Kao 7292*.

CYNOGLOSSUM L. 琉璃草屬

1. **Cynoglossum alpestre** Ohwi in Acta Phytotax. Geobot. 2: 150. 1933; Hsiao in Fl. Taiwan 4: 397. 1978. 高山倒提壺

Endemic. An alpine herb found above 2500 m altitudes, often grows with other herbaceous plants in valley.

Ilan: Nanfutashan, *Hsu 6035*. **Taichung**: Shunkuan, *Huang & Hsieh 7296*.

2. **Cynoglossum furcatum** Wallich in Roxb., Fl. Ind. 2: 6. 1824. 琉璃草

Cynoglossum zeylanicum auct. non Thunb. *ex* Lehm.: Hsiao in Fl. Taiwan 4: 398. 1978.

Japan, S. China, Malesia, Indo-China, India, Pakistan, and Afghanistan. Taiwan, common forest meadow and waste-field herb in the mountain areas.

Specimens examined: Ilan: Nanshan, *Kuoh 3131*. **Hsinchu**: Kwanwu, *Huang 4728*. **Miaoli**: Nanchuang, *Hsu 12681*. **Taichung**: Chika, *Huang 7272*. **Nantou**: Chitou, *Kao 5670*. **Chiayi**: Alishan, *Chuang 2694*. **Kaohsiung**: Nanhen, *Yang 1821*. **Taitung**: Wuling to Chikar, *Jeng 980*. **Hualien**: Hohuanshan, *Hsu 11077*.

The species delimitation of this and the following species is still far from clear. There are also some general habit intermediate between these two species. Riedel (1997) has made some comments on this species complex, and suggested that these might be divided into more subspecies to better reflect their morphological, geographical and ecological differentiation.

3. **Cynoglossum lanceloatum** Forssk., Fl. Aegypt.-Arab. 41. 1775; Hsiao in Fl. Taiwan 4: 397. 1978. 小花倒提壺

Cynoglossum formosanum Nakai in Bot. Mag. (Tokyo) 37: 4. 1923.

Widely distributed in warmer regions of the old world. Taiwan, roadside and forest-edge herb at hilly places.

Ilan: Chiaochi, *Huang & Huang 13126*. **Taipei**: Chiting, *Huang 1517*. **Hsinchu**: Yulou, *Kao 8732*. **Miaoli**: Chiting, *Tang 471*. **Taichung**: Wuling, *Huang 7030*. **Nantou**: Neimoupu to Hoshe, *Huang & Kao 5294*. **Yunlin**: Tuku, *Kao 10464*. **Chiayi**: Tongseh, *Kao 10596*. **Kaohsiung**: Chishan, *Kuoh 1427*.

EHRETIA L. 厚殼樹屬

1. **Ehretia acuminata** R. Br.. Prodr. 497. 1810. 厚殼樹

Ehretia thyrsiflora (Sieb. & Zucc.) Nakai, Trees Shrubs Japan. 1: 327. 1922; Hsiao in Fl. Taiwan 4: 402. 1978.
Ehretia taiwaniana Nakai in J. Arn. Arb. 5:38. 1926.

Japan, S. China, Malesia, Indo-China, India, and Australia. Taiwan, in forests at low altitudes up to 1100 m.

Taichung: Chinshan to Kukuan, *Huang 9690*. **Nantou**: Tanta logging way, *Liu & Hsieh 258*. **Tainan**: Nanshi, *Huang 14208*. **Pingtung**: Nanshan, *Huang 7910*. **Taitung**: Chihpen, *Hsu & Kao 3404*; Lanyu, *Huang & Kao 6238*.

2. **Ehretia dicksonii** Hance in Ann. Sci. Nat. Bot., ser. 4, 18: 224. 1862; Hsiao in Fl. Taiwan 4: 400. 1978. 破布烏

The Ryukyus, S. China, and Himalaya. Taiwan, in forests at low altitudes up to 1500 m.

Taipei: Paili, *Hsu 4347*. **Miaoli**: Shiling, *Kuo & Kao 447*. **Pingtung**: Kenting, *Wang 1399*. **Taitung**: Hsinwulu, *Huang et al. 3704*. **Hualien**: Chimei, *Li 3003*.

3. **Ehretia longiflora** Champ. *ex* Benth. in Hooker's J. Bot. Kew Gard. Misc. 5: 58. 1853; Hsiao in Fl. Taiwan 4: 400. 1978, *p. p.*, *excl. E. lanyuensis* 長花厚殼樹

S. China and Indo-China. Taiwan, in forests at low altitudes up to 750 m.

Ilan: Taichiwushan, *Hsieh 722*. **Taipei**: Chinshinshan, *Tang 1401*. **Kaohsiung**: Liukuei, *Chao 800*.

4. **Ehretia philippinensis** A. DC. In DC., Prodr. 9: 504. 1845; Chang in Bull. Taiwan Prov. Inst. Agr. 7: 71. 1966. 菲律賓厚殼樹

Ehretia takaminei Hatusima in J. Jap. Bot. 27: 210. 1952.
Ehretia lanyuensis Liu and Chuang in Quart. J. Taiwan Mus. 8: 63. 1960.
Ehretia dichotoma auct. non Bl.: Hatusima in Fl. Ryukyu. 510. 1971.

The Philippines and the Ryukyus. Taiwan, confined to the Lanyu island, mainly in forests.

This species differs from *E. longiflora* by its broader corolla and leaves. It differs from *E. dichotoma* by its distinct pedicellate flowers which are terminal on ultimate order branches (*E. dichotoma* with all flowers on one side of main branches).

Taitung: Lanyu, *Ho 997.*

5. **Ehretia resinosa** Hance in J. Bot. 18: 299. 1880; Hsiao in Fl. Taiwan 4: 402. 1978.
恆春厚殼樹

Ehretia formosana Hemsl. in J. Linn. Soc. Bot. 26: 144. 1890

The Philippines. Taiwan, confined to the southern part forests, mainly along seashores.

Tainan: Peimen, *Kao 10599.* **Kaohsiung**: Chiuchutang, *Hsu 1525*; Soushan, *Kao 10517.* **Pingtung**: Oolanpi, *Kao 7114*; Santimen, *Chuang 2247.*

HELIOTROPIUM L. 天芥菜屬

1. **Heliotropium formosanum** I. M. Johnst. in J. Arnold Arbor. 32(2): 114. 1951.
山豆根（臺灣天芥菜）

Heliotropium strigosum Willd. subsp. *brevifolium auct. non* (Wall.) C. B. Clarke: Hsiao in Fl. Taiwan 4: 403. 1978.

Endemic, in coast sandy places.

Miaoli: Tonlou, *Hsu s. n.* **Penghu**: Fongkuai, *Hsu & Kuoh 14017*; Penghu, *Huang 6813.* **Pingtung**: Maopitou, *Huang & Huang 13505*; Oluanpi, *Ou & Kao 9008.*

According to Reidel (1997), *Heliotropium brevifolium* Wall. is a mixed element, and its distribution is from India to the Philippines, not a widely distributed old world species. As a mixture, Taiwan population was lumped into it. However, Johnston (1951) already clearly indicated the differences between this endemic species, *Heliotropium formosanum*, and its related species even the mixture nature of *Heliotropium brevifolium* was still found in his species description.

2. **Heliotropium indicum** L., Sp. Pl. 130. 1753; Hsiao in Fl. Taiwan 4: 403. 1978. 狗尾草

Widely distributed in the tropical regions of the world. Taiwan, a weedy species at low altitudes, mostly found in wet disturbed areas.

Nantou: Sunmoonlake, *Huang 5661.* **Yunlin**: Tuku, *Hsu 4763.* **Chiayi**: Chiayi, *Kao 7896.* **Tainan**: Hsinhua, *Peng 3160.* **Kaohsiung**: Meilung, *Li 2872.* **Pingtung**: Fengkang, *Huang 14091.* **Taitung**: Lanyu, *Huang 4664*; Tawu, *Hsu 4079.*

3. **Heliotropium procumbens** Mill. var. **depressum** (Cham.) H.-Y. Liu, **comb. nov.**
伏毛天芥菜

Heliotropium gracile R. Br. var. *depressum* Cham. in Linnaea 4: 457. 1829.
Heliotropium ovalifolium Forssk. var. *depressum* (Cham.) Merr. in Phillip. J. Sci. (Bot.) 9: 134. 1914; T.-C. Huang in Fl. Taiwan 6: 120. 1979.

Native to C. and S. America. Taiwan, a naturalized weed in southern part.

Tainan: Hsuehchia, *Kao 10356*. **Kaohsiung**: Chishan, *Huang 2439*.

Name combination, *Heliotropium procumbens* Mill. var. *depressum*, mentioned by Fosberg and Sachet in Fosberg *et al.*, (1979) is invalid without any reference to the original publication; therefore, a new combination is needed and made here.

LITHOSPERMUM L. 紫草屬

1. **Lithospermum zollingeri** DC, Prodr. 10: 586. 1846. 梓木草

Buglossoides zollingeri (DC) I. M. Johnst. in J. Arnold Arbor. 35: 45. 1954; Hsiao in Fl. Taiwan 4: 394. 1978.

Japan, Korea, and E. China. Taiwan, confined to mountain areas in the east part of the island.

Hualien: Tiancharng, *Fukuyama 4456*; Taroko, *Peng 13082*

THYROCARPUS Hance 盾果草屬

1. **Thyrocarpus sampsonii** Hance in Ann. Sci. Nat. Bot. ser. 4, 18: 225. 1862; Hsiao in Fl. Taiwan 4: 405. 1978. 盾果草

S. China, Indo-China, and India. Taiwan, in thickets and on hillsides at low and middle altitudes.

Ilan: Aohua, *Huang 15019*. **Taoyuan**: Fuhsing, *Yang 2666*. **Taichung**: Neipu, *Hsu 4710*. **Nantou**: Tungpu, *Huang & Huang 15466*. **Taitung**: Litao, *Huang 3657*.

TOURNEFORTIA L. 紫丹屬

1. **Tournefortia argentea** L. f., Suppl. Pl. 133. 1781. 白水木

Messerschmidia argentea (L. f.) I. M. Johnst. in J. Arnold Arbor. 16: 164. 1935; Hsiao in Fl. Taiwan 4: 404.1978.
Argusia argentea (L. f.) Heine in Fl.. Nouv. Caled 7:109. 1976.

Tropical and subtropical areas of the Old World. Taiwan, along sandy beaches.

Keelung: Pengchiayu, *Huang 15819*. **Pingtung**: Oluanpi, *Peng 3413*. **Taitung**: Lanyu, *Huang 9189*; Lutao *Huang 6934*.

If the distinction of fruit morphology on genus delimitation is emphasized, the name *Argusia argentea* (L. f.) Heine should be used because *Argusia* hold its nomenclatural priority.

2. **Tournefortia sarmentosa** Lam., Tab. Encycl. 1: 416.1791; Hsiao in Fl. Taiwan 4: 405. 1978. 冷飯藤

Malesia and Australia. Taiwan, in dry thickets along seashores in the southern part of the island.

Tainan: Shueichia, *Kao 10600*. **Kaohsiung**: Chiahsien, *Huang & Huang 14486*. **Pingtung**: Hsiaoliuchiu, *Lin 623*.

TRICHODESMA R. Br. 碧果草屬

1. **Trichodesma calycosum** Collett & Hemsl. in J. Linn. Soc. Bot. 28: 92. 1890. 假酸漿

Trichodesma khasianum auct. non C. B. Clarke: Hsiao in Fl. Taiwan 4: 406. 1978.
Trichodesma calycosum Collett & Hemsl. var. *formosanum* (Matsumura) I. M. Johnst. in J. Arnold Arbor. 33: 78. 1952.
Trichodesma formosanum Matsumura in Bot. Mag. (Tokyo) 12: 108. 1898.

S. China, Indo-China, and India. Taiwan, in thickets and on hillsides at low altitudes.

Tainan: **Ilan**: Tali, *Huang 7997*. **Nantou**: Shialishienshi, *Wang 1941*. **Tainan**: Tsengwen Dam, *Jeng 655*. **Kaohsiung**: Taoyuan, *Li 2869*. **Pingtung**: Joupon, *Yang 1050*.

The morphological difference, hair distribution on anthers, between the Taiwan and Mainland China populations, mentioned in Johnston's (1952) paper, is so small to make any biological meaningful isolation; and the author does not think a distinct variety status is needed.

TRIGONOTIS Steven 附地草屬

1. **Trigonotis elevato-venosa** Hayata, Icon. Pl. Form. 6: 32. 1916; Hsiao in Fl. Taiwan 4: 407. 1978. 台北附地草

Endemic, confined to the middle and high altitudes of the northern part of the island.

Ilan: Taipingshan, *Kao 10668*. **Taichung**: Ssuyuan, *Wang 3602*. **Hualien**: Hoping forest track, *Huang 5155*.

2. **Trigonotis formosana** Hayata in J. Coll. Sci. Univ. Tokyo 25: 171. (Fl. Mont. Form.) 1908; Hsiao in Fl. Taiwan 4: 407. 1978. 臺灣附地草

Endemic, most at middle altitudes.

Miaoli: Anmashan, *Huang 8066*. **Nantou**: Chiti, *Hsu 5103*. **Chiayi**: Alishan, *Hsu 6839*. **Tainan**: Tatungshan, *Huang & Huang 16006*. **Hualien**: Antong, *Kao 6136*.

3. **Trigonotis nankotaizanensis** (Sasaki) Masamune & Ohwi *ex* Masamune in Trans. Nat. Hist. Soc. Taiwan 23: 210. 1933; Hsiao in Fl. Taiwan 4: 409. 1978. 南湖附地草

Myosotis nankotaizanensis Sasaki in Trans. Nat. Hist. Soc. Taiwan 9: 155. 1931.

Endemic, an alpine species.

Ilan: Nanhutashan, *Huang 7812*. **Miaoli**: Hsuehshan, *Jeng 1474*. **Kaohsiung**: Kuanshan, *Huang 5404*.

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台灣紫草科植物要覽

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摘　　要

本文為台灣紫草科植物全面訂正之前驅工作，包含 12 屬 24 種之名稱、分布、選擇性證據標本及附記。其中並含貳新組合名：金平氏破布子 *Cordia aspera* G. Forster subsp. *kanehirai* (Hayata) H.-Y. Liu **comb. nov.**, 和伏毛天芹菜 *Heliotropium procumbens* Mill. var. *depressum* (Cham.) H.-Y. Liu **comb. nov**.

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